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Influence of coat colour, sex and age on growth traits of Nigerian local and improved chickens

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ABSTRACT

Two hundred and forty (240) indigenous day-old chickens comprising of frizzle feathered (60), naked neck (60), normal feathered (60) and Noiler (60) were used to carry out this study to determine the association between coat colour and performance of local chickens raised in South-South Nigeria. Data generated from linear body measurements of four chicken genotypes used were subjected to SAS 9.2 (Version 8). The effect of the coat colour on body weight and linear body measurement from 4 to 16 weeks of age for the four genotypes of chickens were significant ($p < 0.05$) for all parameters measured though the brown feather chickens recorded higher least squares means for body weight ($902.34 \pm 57.88g$) and all the linear body parameters measured. The black feather chickens had the lowest least squares mean for all the parameters. The effects of coat/feather colour and sex on body weight and linear body measurements revealed that the male and female brown chickens had highest value for body weight and all the linear body parameters, with the male chickens having the highest least squares means. This study revealed significant effects of coat/feather colour, sex and age on growth traits of Nigerian local and improved chickens.

Key Words: Coat/feather colour, Performance, Indigenous and Strains.

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I. Introduction

The colour of feathers in birds is an important feature determining the descendants of a particular species or breed. The colour of birds enables the birds to interact with each other and their environment. In chickens, the colour of the feather can be used as genetic marker, identifying breeds, populations and breeding groups with their specific traits. Diverse colour in chicken feathers results from two interrelated physical processes, chemical and optical in which pigment and structural colours are formed. The description of Nigerian local chickens is based on phenotypic traits (Adebambo et al., 1999). The Nigerian indigenous or local chicken is a light strain with small body size and extremely variable feather colour, has an early maturing nervous disposition and produces white-

shelled eggs (Oluymi and Robert, 2007). There is various local chicken in different agro-ecological zones of the country having variations in shape, size and feather colour. Adene (2004) also reported that indigenous chickens exhibit significant variations in body size, feather colours, feathering pattern, eggshell, ear lobe and shank colour. Adene and Oguntade (2006) observed that the Nigerian local chickens constituted 75 to 85% of the total population of chickens in the country. Information on the influence of feather colour, age and sex on growth traits of Nigerian local and improved chickens are limited; therefore, this study is of great value.

II. Materials and Methodology

Study location and sample size

This research was carried out at the Poultry Unit of the Research and Teaching Farm of the Faculty of Agriculture, University of Port Harcourt, suited in Obio-Akpor Local Government Area of River State, Nigeria. The site is located at longitude and latitude of 4.77N and 6.45E, with an average temperature of 26°C. Two hundred and forty indigenous day-old chickens comprising 60 birds each (male and female) from 4 strains (Frizzle feathered, naked neck, normal feathered and boiler) were collected from FUNAAB and AMO hatcheries in Nigeria and used for this study.

Management of birds/ Data collections

The experimental birds consisting of 60 mixed sex (male and female) each from the four strains of chickens selected at random from a population of two hundred and forty birds, were raised under an intensive management system. The birds were fed with the best commercial feeds at ad libitum from day old to 16 weeks old, chick starter mash with 21% crude protein was given to them from day old to 8 weeks and growers mash with 16% crude protein from 8 weeks to 16 weeks, freshwater was provided for the birds at all time, all necessary medication and vaccines were given. Good bio-security was also maintained. The linear body measurements of the four strains of chickens commenced with the arrival of the chicks to the 16 weeks. The measurements were taken in the morning before feeding the birds to avoid variations in values. Data were collected on the linear body parameters that defined growth parameters. These include body weight, body length, breast girth, shank length, shank circumference, drumstick length, drumstick circumference, shoulder to tail length, height at withers, nose to shoulder length and wing length. Data collected on growth and linear morphometry were subjected to least squares means using SAS 9.2 version 2008. Level of significance was reported at ($p < 0.05$) and with the superscripts.

III. Results

Tables 01 and Table 05 present the least squares means for the effect of coat/feather colours (ash, black and white, black, brown, strip and white) on body weight and linear body measurement of Nigerian local and improved chickens. The least squares mean indicated a significant difference ($p < 0.05$) between the feather colours for body weight and all the linear body parameters except for body length, neck circumference and wattle length. The brown feather coloured chickens recorded higher least squares means for body weight ($902.34 \pm 57.88\text{g}$) and all the linear body parameters measured WGL ($19.47 \pm 0.54\text{cm}$), SL ($8.43 \pm 0.26\text{cm}$), SC ($3.80 \pm 0.10\text{cm}$), DSL ($9.09 \pm 10.40\text{cm}$), DSC ($6.45 \pm 0.35\text{cm}$), NTSL ($14.69 \pm 0.37\text{cm}$), STTL ($20.32 \pm 0.47\text{cm}$), BL ($31.36 \pm 1.34\text{cm}$), HAW ($29.51 \pm 1.40\text{cm}$), BG ($21.44 \pm 0.63\text{cm}$), COML ($2.61 \pm 0.20\text{cm}$), WTL ($0.99 \pm 0.13\text{cm}$).

Tables 02 and Tables 05 present the least squares means and standard error for the effects of feather colour and sex on body weight and linear body measurements of 4 strains of Nigerian local and improved chickens. The least squares mean for the effects of feather colour and sex on body weight and linear body measurements revealed that the male and female brown chickens had highest value for body weight and all the linear body parameters, with the male chickens having the highest least squares means (BW- $938.64 \pm 73.74\text{g}$, WGL- 19.73 ± 0.66 , SL- 8.52 ± 0.32 , DSL- 11.09 ± 0.48 , NTSC- 20.53 ± 0.58 , BL- 31.76 ± 2.31 , HAW- 29.82 ± 1.1 , BG- 21.74 ± 0.77) followed by male and female white chicken, the strip, black and white, black and lastly the ash feather coloured chickens (Tables 02).

Table 03 and Table 04 revealed that the effect of age and coat/feather colour on the body weight and linear body measurements of the 4 strains of chicken was significantly ($p < 0.05$) different with the

brown feather colour chickens having the highest least squares mean value followed by the white feather colour chickens for all the parameters measured from ages 2-16 weeks. The interactions between age and feather colour were significantly ($p < 0.001$) higher for body weight and not significant ($p > 0.05$) for linear body parameters. The interaction between age and sex were significant ($p < 0.05$) for wing length and height at withers. The interactions between feather colour and sex were not significantly different ($p > 0.05$) for all parameters measured. The interactions between age, feather colour and sex were not significant ($p > 0.05$) for all parameters measured (Table 05).

IV. Discussion

The age and the feather colour of the four strains of chickens exerted significant effects on all parameters from 2 to 16 weeks which was in accordance with the report of Barnejee, (2013), Oguntunji and Ayorinde (2014) in their various study on feather colour of local chickens and Muscovy ducks. In this study, the feather colour significantly affected the growth traits. The brown feather chickens had the highest mean value for all the growth traits measured, which is in accordance with the report by Barnejee (2013) and Oguntunji and Ayorinde (2014). The consistent higher least mean value recorded by the brown and white feather coloured chickens in the current research are similar to the report by Silva et al. (2003) and Oguntunji and Ayorinde (2014), who reported that the higher mean bodyweight of the lighter feather coloured ducks might be attributed to stronger physiological adaptation to heat stress, which is linked to high ambient temperatures in tropical settings. Lighter surfaces reflect heat better than darker surfaces, and animals with lighter coats reflect more light, and absorb 40 to 50 percent less radiation than those with dark coats (McManus et al. 2011), as a result, reduces thermal absorption and body thermal load of the light coat colour animals giving them a physiological advantage over those with dark coat. This study, however, agreed with our findings that the feather colour of the four strains of chickens studied influenced the different aspects of growth traits, as reported by Makram et al. (2021).

The age and the feather colour of the four strains of chickens significantly affected all parameters from 2 to 16 weeks, with the brown and white feather chickens having higher least-squares means value is by the report by Makram et al. (2021). A study by Houndonougbo et al. (2017) reported that the grey guinea fowl had higher body weight at 5 weeks and 28 weeks compared to black guinea fowl under the same rearing conditions. They also indicated the plumage differences. Genetic variations in terms of plumage colour affect birds' performances. However, in another study done on the effect of plumage colour of ducks by Yakan et al. (2012) and Kirmizibayrak and Boğa (2018) pointed out that there was no significant effect of plumage colour on geese carcass traits. On the contrary, Ismoyowati et al. (2018) reported that the birds with white, black feathers in Indonesian Muscovy had the heaviest bodyweight, which agreed with this study.

V. Conclusion

This study revealed that experimental birds with brown feather colour had better performance than the other feather/coat colour chickens. This information can be used for the improvement of chickens breeding programmes.

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Table 01. Least squares means and standard error for the effect of feather colour on body weight (g) and linear body parameters (cm) of four strains of Nigerian local and improved chickens at 4-16 weeks of age

Feather colour	No	BW (g)	WGL (cm)	SL (cm)	SC (cm)	DSL (cm)	DSC (cm)	NSTL (cm)	STTL (cm)	BL (cm)	HAW (cm)	BG (cm)	NEC (cm)	COML (cm)	WTL (cm)
Ash	36	700.12 ±	17.60 ±	8.14 ±	3.29 ±	9.45 ±	6.24 ±	12.92 ±	18.10 ±	30.97 ±	25.57 ±	19.70 ±	2.52 ±	1.97 ±	0.63 ±
		40.36 ^{bc}	0.46 ^{ab}	0.58 ^a	0.10 ^b	0.32 ^{bcd}	0.27 ^a	0.26	0.43 ^b	0.71 ^c	1.07 ^{bc}	0.54 ^c	0.41	0.14 ^c	0.08
Black and white	52	735.62 ±	17.69 ±	7.67 ±	3.35 ±	9.68 ±	6.33 ±	12.88 ±	18.35 ±	31.01 ±	26.68 ±	19.23 ±	2.94 ±	2.08 ±	0.83 ±
		69.82 ^{bc}	0.79 ^{ab}	0.40 ^a	0.16 ^b	0.55 ^{bc}	0.45 ^a	0.44	0.80 ^b	1.21 ^b	1.71 ^c	0.92 ^c	0.71	0.29 ^b	0.14
Black	36	651.35 ±	17.24 ±	7.23 ±	3.22 ±	10.88 ±	5.82 ±	12.72 ±	17.78 ±	29.88 ±	26.26 ±	19.86 ±	2.13 ±	1.83 ±	0.58 ±
		24.22 ^c	0.28 ^c	0.13 ^a	0.06 ^b	0.19 ^d	0.17 ^a	0.16	0.28 ^{bc}	0.47 ^c	0.66 ^c	1.19 ^c	0.24	0.09 ^c	0.04
Brown	60	902.34 ±	19.47 ±	8.43 ±	3.80 ±	9.09 ±	6.45 ±	14.69 ±	20.32 ±	31.36 ±	29.51 ±	21.44 ±	2.21 ±	2.61 ±	0.99 ±
		57.88 ^a	0.54 ^a	0.26 ^a	0.10 ^a	0.40 ^a	0.35 ^a	0.37	0.47 ^a	1.34 ^a	1.40 ^a	0.63 ^b	0.44	0.20 ^a	0.13
Strip	26	524.73 ±	14.12 ±	5.68 ±	2.78 ±	6.82 ±	3.73 ±	11.18 ±	15.37 ±	26.43 ±	19.25 ±	15.50	2.15 ±	1.06 ±	0.87 ±
		79.45 ^d	0.69 ^d	0.59 ^b	0.39 ^b	0.67 ^e	0.58 ^b	0.82	1.65 ^d	2.52 ^d	4.42 ^d	±1.58 ^d	0.43	0.47 ^d	0.11
White	30	719.15 ±	17.94 ±	7.87 ±	3.62 ±	9.87 ±	6.51 ±	13.56 ±	18.75 ±	31.55 ±	27.45 ±	25.54	2.17 ±	2.19 ±	0.82 ±
		42.26 ^b	0.43 ^b	0.22 ^a	0.10 ^a	0.30 ^b	0.26 ^a	0.29	0.45 ^b	0.78 ^a	1.08 ^b	±4.60 ^a	0.36	0.14 ^b	0.09
Overall mean	240	722.36 ±	17.73 ±	7.68 ±	3.39 ±	9.53 ±	6.16 ±	13.19 ±	18.40 ±	30.71 ±	26.53 ±	20.99 ±	2.24 ±	2.06 ±	0.72 ±
		16.45	0.18	0.13	0.04	0.13	0.11	0.11	0.17	0.32	0.43	0.93	0.15	0.06	0.30

a, b, c, d: Means with different superscripts on same column are significantly different (p<0.05).

BW= Body weight, WGL= Wing length, SL= Shank length, DSL= Drumstick length, NSTL= Nose to shoulder length, TL= Trunk length, STTL= Shoulder to tail length, BL= Body length, NEC= Neck circumference, BG= Breast girth, HAW= Height at withers, COML = Comb length, WTL= Wattle length, NO= no of observation.

Table 05. Means square and significance for the effect of age, feather colour and sex on body weight and linear body measurements of 4 strains of Nigerian local and improved chickens

Sources of variation	DF	BW (g)	WGL (cm)	SL (cm)	SC (cm)	DSL (cm)	DSC (cm)	HAW (cm)
Age	5	28345118.19***	3247.47***	1044.97***	7.77***	1856.15***	1273.74***	16794.64***
Feather colour	6	95408.10*	2.62ns	7.72ns	0.75**	2.98*	2.51ns	26.35**
Sex	1	722251.60ns	8.02*	0.38ns	0.59ns	3.77*	0.33ns	31.78*
Age* Feather colour	28	94031.50***	2.68ns	4.69ns	0.20ns	1.23ns	1.08ns	9.53ns
Age*Sex	8	70409.60ns	4.30*	2.56ns	0.29ns	1.61ns	2.74ns	21.68*
Feather colour*Sex	5	14410.00ns	2.4ns	5.11ns	0.22ns	0.48ns	1.99ns	7.09ns
Age*Feather colour*Sex	25	41769.20ns	0.94ns	2.46ns	0.18ns	1.30ns	1.72ns	7.66ns

*=Significant (p<0.05), ***= highly significant (p<0.001), ns= not significant. BW= Body weight, WGL= Wing length, SL= Shank length, DSL= Drumstick length, DSC= drumstick circumference, HAW= Height at withers.

Table 02. Least squares means and standard error for the effects of feather colour and sex on body weight (g) and linear body measurements (cm) of Nigerian local and improved chickens at 4 to 16 weeks

Sources of variation	Sex	No	BW (g)	WGL (cm)	SL (cm)	SC (cm)	DSL (cm)	DSC (cm)	NSTL (cm)	STTL (cm)	BL (cm)	HAW (cm)	BG (cm)	COML (cm)	WTL (cm)	NEC (cm)
Ash	Female	18	683.96 ± 52.94	17.35 ± 0.61	8.66 ± 1.09	3.27 ± 0.13	9.28 ± 0.42	6.21 ± 0.39	12.80 ± 0.35	17.98 ± 0.56	30.66 ± 0.91	26.08 ± 1.38	19.42 ± 0.71	1.66 ± 0.15	0.39 ± 0.07	4.77 ± 0.55
			Male	18	718.58 ± 61.94	17.89 ± 0.69	7.56 ± 0.33	3.31 ± 0.13	9.68 ± 0.48	6.39 ± 0.39	13.05 ± 0.40	18.27 ± 0.66	31.32 ± 1.10	26.49 ± 1.55	20.01 ± 0.83	2.32 ± 0.25
Black & White	Female	28			691.83 ± 108.58	16.06 ± 1.18	7.39 ± 0.62	3.18 ± 0.23	9.50 ± 0.86	5.98 ± 0.68	12.47 ± 0.65	17.37 ± 1.20	29.82 ± 1.81	25.42 ± 2.53	18.08 ± 1.35	1.74 ± 0.27
			Male	24	774.03 ± 90.65	18.36 ± 1.06	7.92 ± 0.53	3.51 ± 0.21	9.65 ± 0.72	6.64 ± 0.60	13.24 ± 0.61	19.24 ± 1.06	32.08 ± 1.63	27.80 ± 2.34	20.26 ± 1.26	2.39 ± 0.32
Black	Female	20			630.60 ± 30.20	17.18 ± 0.37	7.17 ± 0.17	3.19 ± 0.01	9.03 ± 0.25	5.79 ± 0.22	12.68 ± 0.21	17.75 ± 0.36	29.72 ± 0.62	25.36 ± 0.65	20.52 ± 0.53	1.66 ± 0.11
			Male	16	689.09 ± 40.44	17.43 ± 0.43	7.34 ± 0.22	3.28 ± 0.09	9.23 ± 0.31	5.91 ± 0.26	12.82 ± 0.27	17.91 ± 0.42	30.24 ± 0.75	26.05 ± 1.06	19.05 ± 2.09	2.10 ± 0.14
Brown	Female	30			817.40 ± 86.71	18.88 ± 0.93	8.23 ± 0.45	3.64 ± 0.18	10.39 ± 0.69	6.26 ± 0.92	13.97 ± 0.52	18.82 ± 0.80	30.40 ± 2.51	28.79 ± 2.43	20.74 ± 1.06	1.88 ± 0.25
			Male	30	938.64 ± 73.74	19.73 ± 0.66	8.52 ± 0.32	3.87 ± 0.13	11.09 ± 0.48	6/53 ± 0.60	14.98 ± 0.47	20.53 ± 0.58	31.76 ± 2.31	29.82 ± 1.11	21.74 ± 0.77	2.92 ± 0.26
Strip	Female	14			709.22 ± 77.96	17.51 ± 0.93	7.55 ± 0.48	3.38 ± 0.39	9.38 ± 0.60	6.17 ± 0.53	13.06 ± 0.58	19.16 ± 1.04	31.85 ± 1.74	26.52 ± 2.20	20.12 ± 1.02	1.79 ± 0.24
			Male	12	723.77 ± 59.04	17.81 ± 0.14	7.609 ± 0.32	3.40 ± 0.21	9.32 ± 0.43	6.39 ± 0.42	13.50 ± 0.43	18.42 ± 0.62	30.84 ± 1.01	25.84 ± 1.54	20.33 ± 0.83	2.22 ± 0.23
White	Female	16			770.16 ± 67.92	17.79 ± 0.68	7.67 ± 0.35	3.48 ± 0.14	9.81 ± 0.49	6.26 ± 0.41	13.56 ± 0.47	18.54 ± 0.65	30.82 ± 1.30	26.83 ± 1.71	20.31 ± 0.82	1.86 ± 0.19
			Male	14	801.10 ± 54.16	18.94 ± 0.56	7.94 ± 0.28	3.70 ± 0.15	9.91 ± 0.38	6.67 ± 0.34	13.56 ± 0.38	18.67 ± 0.54	32.01 ± 0.98	27.84 ± 1.41	26.83 ± 0.46	2.40 ± 0.18

BW= Body weight, WGL= Wing length, SL= Shank length, DSL= Drumstick length, DSC= drumstick circumference, NSTL= Nose to shoulder length; STTL= Shoulder to tail length, BL= Body length, NEC= Neck circumference, BG= Breast girth, HAW= Height at withers, COML = Comb length, WTL= Wattle length

Table 03. Least squares means and standard error for the effects of age and feather colour on body weight (g) and linear body measurement (cm) of Nigerian local chickens at 2-8 weeks

Source of variation		BW(G)	WGL (CM)	SL (CM)	DSL(CM)	NTSC (CM)	STTL	BL	BG
Age	Colour								
2	Ash	72.63±2.65 ^c	7.44±0.13 ^c	4.40±0.10 ^a	4.12±0.10 ^b	7.46±0.71 ^b	8.45±0.19 ^c	15.45±0.52 ^b	8.24±0.19 ^c
	Black and white	70.55±2.39 ^c	7.13±0.21 ^c	3.15±0.16 ^b	3.79±0.37 ^c	7.47±0.08 ^b	6.08±0.32 ^d	15.30±0.56 ^b	7.83±0.33 ^d
	Black	77.56±3.00 ^c	7.80±0.11 ^c	3.36±0.06 ^b	3.87±0.08 ^c	7.04±0.84 ^b	8.61±0.14 ^c	13.78±0.58 ^{bc}	8.45±0.13 ^c
	Brown	124.5±1.00 ^a	9.52±0.22 ^a	4.65±0.56 ^a	5.68±0.08 ^a	8.83±0.09 ^a	11.97±0.20 ^a	16.00±0.00 ^a	11.16±0.13 ^a
	Strip	85.50±1.17 ^b	7.35±0.25 ^c	3.25±0.25 ^b	4.25±0.25 ^b	7.75±1.06 ^b	8.50±0.50 ^c	15.75±0.75 ^b	9.00±0.00 ^b
	White	93.72±6.48 ^b	8.15±0.18 ^b	3.60±0.10 ^b	4.74±0.15 ^b	7.78±0.87 ^b	9.20±0.33 ^b	12.94±1.60 ^d	9.28±0.23 ^b
4	Ash	300.4±1.10 ^b	13.10±0.21 ^c	5.40±0.06 ^b	6.57±0.17 ^b	10.69±0.78 ^c	13.41±0.35 ^d	24.46±0.27 ^{bc}	15.82±0.59 ^b
	Black and white	292.4±1.60 ^b	13.00±0.25 ^c	5.29±0.09 ^b	6.45±0.57 ^b	10.62±0.20 ^c	13.74±0.15 ^d	24.12±0.60 ^{bc}	13.66±0.18 ^{bc}
	Black	259.08±1.40 ^c	13.40±0.26 ^v	5.38±0.55 ^b	6.23±0.57 ^b	10.83±0.98 ^c	13.24±0.13 ^d	24.59±0.27 ^{bc}	14.29±0.13 ^c
	Brown	363.16±1.80 ^a	15.64±0.65 ^a	6.06±0.04 ^a	7.25±0.20 ^a	12.33±0.28 ^a	16.06±0.32 ^a	28.18±0.62 ^a	17.75±0.27 ^a
	Strip	338±1.60 ^a	14.01±0.34 ^b	5.70±0.12 ^b	6.38±0.13 ^b	11.27±0.70 ^b	14.75±0.23 ^c	26.25±0.75 ^c	15.00±0.60 ^b
	White	349±1.40 ^a	14.17±0.05 ^b	5.40±0.08 ^b	6.78±0.13 ^b	11.50±0.98 ^b	15.75±0.25 ^b	27.25±0.45 ^b	15.75±0.50 ^b
6	Ash	440.40±0.93	15.32±0.43 ^b	5.11±0.12 ^c	6.68±0.23 ^c	11.26±0.61 ^c	16.35±0.26 ^c	28.01±0.42 ^{bc}	16.93±0.29 ^{bc}
	Black and white	383.16±1.90	15.23±0.50 ^b	6.97±0.27 ^b	7.12±0.13 ^b	11.83±0.07 ^c	15.45±0.48 ^c	27.05±0.81 ^d	16.31±0.58 ^{bc}
	Black	448.87±2.02	15.13±0.50 ^b	5.91±0.08 ^c	7.05±0.13 ^b	11.75±0.42 ^c	16.34±0.17 ^c	27.98±0.31 ^d	17.08±0.18 ^c
	Brown	618.00±1.50 ^a	17.31±0.35 ^a	7.67±0.19 ^a	8.43±0.23 ^a	13.97±0.05 ^a	19.54±0.35 ^a	33.47±0.34 ^a	19.66±0.08 ^a
	Strip	486.10±1.30	15.75±0.76 ^b	6.58±0.19 ^b	7.33±0.23 ^b	12.50±0.14 ^b	17.00±0.50 ^b	29.69±0.46 ^c	18.10±1.00 ^b
	White	544.58±1.80	15.78±0.34 ^b	6.25±0.12 ^b	7.44±0.07 ^b	12.26±0.54 ^b	17.46±0.29 ^b	30.05±0.48 ^b	18.75±0.35 ^b

a, b, c, b, d: Means with different superscripts on same column are significantly different ($p < 0.05$).

BW= Body weight, *WGL*= Wing length, *SL*= Shank length, *DSL*= Drumstick length, *NTSL*= Nose to shoulder length, *TL*= Trunk length, *STTL*= Shoulder to tail length, *BL*= Body length, *NEC*= Neck circumference, *BG*= Breast girth,

Table 04. Least squares means and standard error from the effects of age and feather colour on body weight (g) and linear body measurement (cm) of Nigerian local chickens at 8-16 weeks

Source of variation	BW(G)	WGL (CM)	SL (CM)	DSL(CM)	NTSC (CM)	STTL (cm)	BL (cm)	BG (cm)	
Age	Colour								
8	Ash	706.52±0.11 ^c	19.95±0.23 ^c	7.60±0.12 ^b	9.13±0.14 ^b	13.32±0.18 ^b	20.57±0.23 ^c	33.39±0.36 ^c	20.92±0.50 ^c
	Black and white	688.01±0.12 ^{bc}	19.07±0.10 ^c	7.33±0.20 ^b	9.00±0.17 ^b	13.00±1.49 ^b	20.00±0.55 ^c	33.04±0.80 ^c	19.92±0.53 ^{bc}
	Black	669.12±0.13 ^{bc}	19.43±0.18 ^c	7.35±0.27 ^b	9.21±0.14 ^b	13.35±0.49 ^b	20.12±0.99 ^c	33.26±0.23 ^c	22.03±0.68 ^b
	Brown	917.33±1.10 ^a	21.85±0.24 ^a	8.30±0.07 ^a	10.41±0.12 ^a	14.81±0.90 ^a	22.10±0.29 ^a	36.53±0.50 ^a	27.89±0.26 ^a
	Strip	646.01±1.12 ^{bc}	19.10±1.00 ^c	7.50±0.06 ^b	9.00±0.50 ^b	13.00±0.70 ^b	20.25±0.39 ^c	33.23±0.25 ^c	20.00±0.05 ^c
	White	864.38±0.11 ^b	20.43±0.23 ^b	8.30±0.18 ^a	10.07±0.24 ^a	14.07±0.24 ^a	21.26±0.27 ^b	35.36±0.42 ^b	22.48±0.31 ^b
12	Ash	1047.52±0.58 ^{bc}	23.71±0.24 ^{bc}	10.33±0.12 ^b	13.66±0.28 ^c	15.50±0.56 ^{bc}	23.33±0.27 ^c	39.10±0.50 ^{bc}	25.18±0.44 ^c
	Black and white	1232.5±0.56 ^b	24.25±0.29 ^b	10.58±0.19 ^b	14.33±0.23 ^b	15.87±0.71 ^{bc}	24.45±0.34 ^b	38.66±1.36 ^{bc}	24.33±0.47 ^{bc}
	Black	1121.23±0.32 ^c	23.37±0.18 ^{bc}	10.33±0.15 ^b	13.65±0.18 ^c	15.53±0.25 ^{bc}	23.55±0.17 ^c	38.79±0.36 ^{bc}	24.85±0.28 ^{bc}
	Brown	1510.28±0.32 ^a	25.67±0.32 ^a	11.95±0.27 ^a	16.03±0.25 ^a	18.02±0.44 ^a	25.65±0.33 ^a	42.66±0.58 ^a	28.10±0.50 ^a
	Strip	1237.00±0.67 ^b	24.02±0.31 ^b	10.62±0.26 ^b	13.64±0.48 ^c	16.66±0.44 ^c	24.05±0.35 ^b	40.28±0.60 ^c	25.50±0.50 ^c
	White	1263.8±0.75 ^b	24.32±0.44 ^b	11.29±0.22 ^a	14.82±0.27 ^b	17.09±0.29 ^b	24.84±0.33 ^b	41.89±0.58 ^b	27.57±0.28 ^b
16	Ash	1707.59±0.75 ^{bc}	26.57±0.42 ^b	13.09±0.21 ^b	16.79±0.36 ^b	17.09±0.56 ^d	26.00±0.45 ^b	46.07±0.80 ^c	31.84±0.86 ^c
	Black and white	1700.00±0.74 ^{bc}	26.37±0.39 ^b	13.26±0.25 ^b	16.80±0.69 ^b	19.17±0.06 ^c	27.80±0.53 ^a	46.93±0.80 ^c	31.34±0.13 ^c
	Black	1551.01±0.51 ^c	26.03±0.55 ^b	11.96±0.19 ^{bc}	16.89±0.25 ^b	18.26±0.75 ^{bc}	26.59±0.30 ^b	44.93±0.43 ^{bc}	30.23±0.42 ^{bc}
	Brown	2024.62±0.96 ^a	27.95±0.54 ^a	15.60±0.22 ^a	18.45±0.47 ^a	22.04±0.75 ^a	27.84±0.85 ^a	49.39±0.93 ^a	33.03±0.64 ^a
	Strip	1546±1.10 ^{bc}	25.68±0.50 ^c	12.60±0.26 ^c	15.90±0.37 ^c	19.04±0.36 ^c	26.70±0.37 ^b	46.83±0.83 ^c	30.89±0.60 ^{bc}
	White	1882.73±1.80 ^b	27.10±0.39 ^a	13.03±0.19 ^b	17.03±0.31 ^b	20.33±0.70 ^b	27.78±0.38 ^a	47.83±0.91 ^b	32.95±0.47 ^b

a, b, c, d: Means with different superscripts on same column are significantly different ($p < 0.05$).

BW= Body weight, *WGL*= Wing length, *SL*= Shank length, *DSL*= Drumstick length, *NTSL*= Nose to shoulder length, *TL*= Trunk length, *STTL*= Shoulder to tail length, *BL*= Body length, *NEC*= Neck circumference, *BG*= Breast girth